



# **Guidelines**

*for the Preparation of*

## **Studies**

## **for Building Projects**

*for*

COMMONWEALTH OF MASSACHUSETTS  
State Agencies  
Building Authorities  
Counties

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Commonwealth of Massachusetts  
Division of Capital Asset Management

## Preface

This document provides guidelines for the preparation of studies and programs for building projects by State Agencies, Counties, and Building Authorities. Chapter Seven of the Massachusetts General Laws requires the Division of Capital Asset Management (DCAM) to establish these guidelines and to supervise the preparation of studies and programs.

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## **1.0 Executive Summary**

Studies and programs are a critical component of the reforms resulting from the investigation by the Ward Commission of the State's construction practices in the 1970's. In summary, the Commission found that fraud and waste resulted from the following practices in the pre-design phase:

- (i) ineffective evaluation of needs, leading to unnecessary buildings
- (ii) poor architectural programming, leading to inefficient buildings and inaccurate cost estimates;
- (iii) unnecessary increase in the scale of projects leading to increased design fees and construction costs; and
- (iv) constant changes in programs, leading to delays in design and construction.

As a result of their investigation, the Commission urged the passage of special legislation, the Construction Reform Act, which was enacted into law in 1980 as Chapter 579. In addition to other reforms, this law sets forth new requirements for pre-design activities in the form of studies and programs, which are intended to reduce or eliminate such inefficiencies and cost overruns. (For simplicity, the word "study" will be used hereafter to include both study and program.)

In brief, Massachusetts General Laws Chapters 7 and 29 require that for all state building projects for state agencies:

1. A study must be prepared prior to contracting for the design or construction.

2. The study must be certified by the Commissioner of Capital Asset Management prior to contracting for final design services and construction.
3. The designer preparing the study must be selected by the Designer Selection Board, and can be appointed by the DCAM Commissioner to perform final design services for that project subject to the approval of the Designer Selection Board.

State agencies will normally be required to have completed studies before they request appropriations for final design and construction. After completion, studies must be certified by the Commissioner of DCAM for accuracy and completeness, and there cannot be substantial deviation from the certified study during final design or construction.

The purpose of studies is to investigate, justify and define projects before design begins. The legislature can then make better-informed decisions prior to appropriating funds for design and construction. As a result unnecessary and wasteful projects will be avoided. Thus, the preparation of a study is not a guarantee of eventual construction, since a study may result in a recommendation not to proceed into design and construction. In addition, the legislature may decide not to appropriate design and construction funds.

A "study" is a pre-design document, which identifies and evaluates alternative solutions to the needs of an agency. It involves the definition and verification of that agency's needs, the

evaluation of potential solutions, and the recommendation of a means of implementation. The study results in a final "program" which defines the preferred solution in terms of its content, time and cost, so that it provides a clear and detailed frame of reference for the design and implementation process. In practice, the study and program will usually be combined into a single document, hereafter called a study.

Because of the diversity of projects, for practical purposes, the length and content of a study should depend on the complexity of the project. However, all studies should contain the following general information at a minimum:

- (a) Explanation of needs and requirements.
- (b) Evaluation of alternative solutions.
- (c) Definition of "program" of preferred solution, summary of proposed scope of work, and detailed cost estimate.

A study has multiple functions. It is not only a prospectus in the planning and budgeting process for the using agency, DCAM, the Executive Office of Administration and Finance, and the legislature, but it is also a detailed set of design directions and a scope of work for the final designer, a control on programmatic changes made during construction, and the basis for post-occupancy evaluation.

Studies should be initiated through requests for studies as part of the annual capital outlay budget process. Studies may be prepared by agency staff or by DCAM staff or by consulting designers. Funding of consulting design services shall be from capital outlay appropriations under DCAM supervision. For ease

of distinction, the designer of a study will hereafter be called a "study designer", and the designer of final design documents, which may in some cases be the same entity, will be called a "final designer". Also, the word "designer" will be used hereafter for staff designers and consulting designers.

A series of studies of increasing detail may be required on large-scale projects, before the study of a particular building can be prepared in sufficient detail for purposes of certification and implementation. Such "earlier" studies include master plans of a complex of buildings, which also fall under DCAM jurisdiction.

Studies focusing primarily on management, organization, or service/ program issues, (in which buildings may be one outcome, but not the primary outcome), properly fall under the jurisdiction of the operating agency and not DCAM. Such studies should not be funded with capital outlay funds and are not supervised by DCAM; they should be supervised and funded by the agency concerned. If proposals for building projects arise out of such management/policy studies, these building projects will be within the jurisdiction of DCAM and must go through the formal study process required by Chapter 7 and Chapter 29 of the Massachusetts General Laws..

These guidelines are organized so that the reader can focus on the areas of particular concern rather than having to read the entire document. The user institutions and operating agencies will need to be aware of the statutory requirements in section 2 (covering types of project, jurisdiction and controls) and the administrative procedures in Section 3 (describing how and when to apply for a study through the capital outlay budge process). Study designers will need to refer to the technical study

requirements explained in sections 4 through 7, and the format for reports documenting the study process in Section 8.



## **2.0 Summary of Statutory Requirements and Procedures**

Applicable sections of the Massachusetts General Laws (MGL) are summarized below as they apply to studies. The statutory citation is provided in each case. The full text of the statute is available from DCAM. In certain cases DCAM guidelines may be more restrictive than the law, and if so this is clearly indicated. Definitions are provided at the end of these guidelines.

- 2.1 Requirement for studies.** (C. 29, S. 7K): Studies (including programs) must be prepared for all building projects of state agencies and building authorities. "State agencies" includes counties.

The only case where a study is *not* needed is when the appropriation or authorization specifically states that no such study need be or shall be done, based on a recommendation by DCAM in the capital budget. (C.29, S. 7E).

- 2.2 Jurisdiction over studies.** (C.7, S. 41B): The Office of Programming within DCAM has control and supervision of the study and programming of all capital facility projects of state agencies and building authorities. Master plans for large projects involving multiple buildings also fall within the jurisdiction of this Office.

- 2.3 Maintenance projects:** (C.7, S. 40B) State agencies and building authorities shall have control and supervision over the ordinary maintenance of their buildings to the extent that their estimated cost is *under* \$100,000, or *over* \$100,000 if the project does *not* involve structural or mechanical work. "Maintenance" is

defined as day-to-day, routine, normally recurring repairs and upkeep. However, designers for these projects must be selected by the Designer Selection Board through DCAM, unless the total fee for design services (both study and design) is less than \$10,000.

*Annual maintenance projects:* Many state agencies regularly enter into annual maintenance contracts that involve repairs, replacements, and upkeep to their facilities. DCAM does not exercise jurisdiction if these contracts neither exceed \$100,000 nor involve structural or mechanical work.

*Recurring maintenance projects:* DCAM will not exercise any jurisdiction over a maintenance project where there will be \$100,000 or more expended on repairs or replacements to mechanical systems, if the repair or replacement can be legitimately characterized as an "in-kind replacement" of existing systems, where no significant re-design is necessary. However, if any significant re-design will be required to accommodate the replacement equipment or system, the project will be under DCAM's control and supervision, and a study will be necessary.

## **2.4 (not used)**

**2.5 Preparation of studies by staff or consultants.** Because of the variety of projects, studies may be prepared by staff designers or by consulting designers. In all cases, DCAM must review the content and certify the results of the study.

- (i) *Agency staff:* Studies may be prepared by agency staff if they have the time and expertise. It is expected that many simple projects may be handled in this manner.

- (ii) *DCAM staff:* DCAM will provide assistance to agencies as necessary and will, in some cases, conduct the entire study "in-house".
- (iii) *Consulting designers:* A complex study will need the services of a consultant designer who will be supervised by DCAM.

**2.6 Source of study funds:** (C.29 S.2G): Funds for conducting studies by consulting designers for state agencies (*except* counties) may be available through a specific state appropriation or the DCAM "planning contingency fund". Funds for studies by consulting designers for counties and building authorities must be provided by the counties or building authorities themselves.

**2.7 Requests for study funds:** (C. 29, S. 7A-E): Proposals by agencies to have DCAM undertake studies and programs should be included in the local agencies' long range capital facility development plans (5 year plans); and in their annual capital facility budget requests. This applies to State agencies, including counties. DCAM must review and make recommendations to the Governor regarding these requests.

**2.8 Selection of consulting designers:** (C. 7, S. 38C) The Designer Selection Board (DSB) has jurisdiction over the selection of all designers preparing studies for state building projects unless the design fee for the study contract is less than \$10,000 or the estimated construction cost of the project is less than \$100,000.

Note that the DSB must select designers for *all* state building projects within the provisions of C. 7 S. 38 C, with a design fee over \$10,000, regardless of whether they are under DCAM

jurisdiction, unless the user agency requests and is granted an exemption.

**2.9 Timing of studies:** (C. 29, S.7K): A study for a building project for which a state agency is the using agency , must be "satisfactorily completed" and certified (see 2.12 below) by law, before the following can occur:

- (i) Contracting with any designer for the final design phase
- (ii) The performance of services for design or construction for or by the administering agency (Including use of consulting or staff designers.)
- (iii) Funds are allotted, encumbered or expended for final design or construction.

**2.10 Completion of study before appropriation:** State agencies will normally be required by DCAM *guidelines* to complete and approve studies earlier--*before* they request appropriations for final design and construction. Exceptions permitting an appropriation request *prior* to completion of a study include cases of emergency or other appropriate reasons. However, the legislature may decide to fund a project earlier at its own discretion. The purpose of this sequence is to provide the legislature with more information in advance of their appropriation decisions.

**2.11 Request for funds for final design:** After a study is complete, funding for final design and construction must be sought from the legislature by requesting DCAM to include the project in the capital outlay budget.

Final design cannot proceed until funding is approved by the legislature unless the use of certain contingency funds is approved by DCAM. These contingency funds are available at the discretion of DCAM for the following special categories of projects of state agencies, excluding counties: fire protection improvements, emergency repairs, preventive maintenance, waste water improvements, air pollution abatement, energy conservation measures and architectural barriers removal.

**2.12 Certification of studies:** There are three certifications required by statute of any study. The certifications, which occur *after* appropriation are intended to ensure that the study process meets the full intent of the law, namely to ensure that the project meets agency needs and can be built within the appropriation amount. (Standard forms are provided by DCAM for each certification.)

**2.13 1st Certification - accuracy and funding (C.29, S.7K):** The first certification indicates "satisfactory completion" of the study. It is required before (a) DCAM contracts with the final designer, and (b) the performance of any design or construction services. The first certification is made by the following three parties:

- (i) the Operating Agency (central office) -- that the study corresponds to the current needs of the agency;
- (ii) The DCAM Director of Programming, that the study:
  - (a) reflects the agency's needs,
  - (b) gives an accurate estimate of project requirements, cost and schedule, and
  - (c) can be accomplished within the appropriation; and

- (iii) the Commissioner of DCAM, that the study is in conformity with the scope and purpose of the appropriation and that he/she approves proceeding with design and construction

**2.14 2nd Certification - No deviation in design:** (C.29, S.26A):

Before design can proceed, a *second* certification must be provided to the state comptroller or county treasurer by the Commissioner of DCAM, that the design phase will result in a project which can be accomplished without substantial deviation from the study. In no case can the design result in a change of more than ten percent of the square feet specified in the study. The comptroller or treasurer cannot approve the allotment, encumbrance or expenditure of funds for design until this certification has been received.

**2.15 3rd Certification - No deviation in construction:** (C. 29, S. 26B): After design, and before construction can proceed, a *third* certification must occur. It is similar to the second certification, except that it indicates the *construction* phase can be accomplished without substantial deviation from the study.

**2.16 Completion -vs.- Certification:** To clarify, there is need for a clear distinction between completion and approval of a study *before* appropriation, and certification of a study *after* appropriation. Completion is usually required by *DCAM guidelines* before appropriation, while certification is required by *law* after appropriation. Once certified, there cannot be substantial deviation from the study in final design or construction. The law thereby makes allowance for the fact that the legislature may appropriate funds for final design and construction before *or* after a study is complete. If the appropriated amount is different from the requested amount, or the appropriation is for a different scope of project, then the study

must be amended, if justified, before certification, or the project will not proceed.

**2.17 Use of contingency funds:** (C.29, S. 7F): Contingency funds are reserve funds used only when unforeseeable circumstances cause the cost of the project to exceed the sums appropriated or authorized. In no case shall design and construction be allocated if the use of the funds will result in:

- (i) a substantial deviation from any study or design most recently approved;
- (ii) a cumulative increase in the number of gross square feet in excess of ten percent of the number most recently specified in the study; or
- (iii) the cumulative amount allocated from the fund to any one project exceeds ten percent of the total cost specified by the appropriation or authorization for that project.

**2.18 Change orders affecting studies** (C.7 S. 42F): If a change order during construction would result in a deviation from a study, then the user agency may appeal to the Secretary of Administration and Finance.

**2.19 Post occupancy evaluation** (C.7, S. 41B): If a post-occupancy evaluation is performed on the project, it must be based on the design criteria developed previously in the study.

The operating agency is responsible for providing relevant information and can make recommendations on the conduct and scope of the study. The operating agency and local user agency or institution shall designate staff to represent the agencies.

### **3.0 Administrative Procedures and Recommendations**

Following is a description of administrative procedures to be followed by DCAM, agencies and designers in conducting a study. (The actual study process followed by designers is described in section 4 following).

#### **3.1 Initiating and funding a study:** A study can be initiated and funded in one of three ways:

- (i) If a consulting designer is required to conduct the study, then the study should be initiated through a request by the local institution or user agency for funds to hire the consulting study designer. This request is made in the agency's annual capital budget submission each Fall. (The agency should not request design and construction funds until a study has been completed and approved.)

The study request will be given a priority rating after review by the respective Operating Agency (central office), by the respective Executive Office, and then by DCAM. Such studies may be started prior to the passage of the Capital Outlay Bill only if they are high priority and if sufficient study contingency funds are available to DCAM.

- (ii) Studies requiring consulting designers may also be initiated through special written request to DCAM at other times of the year. However, such requests will only be considered if they are high priority and if they are available funds for such studies. Studies included in previous Capital Outlay request will usually be given first priority.



- (iii) If an agency expects DCAM to conduct a study using in-house design staff, or if the agency intends to use its own staff (and therefore does *not* need funding for consulting designers), the agency should send a written proposal to DCAM. Such proposals must be approved by DCAM in advance of the study proceeding. This information should also be included in the annual capital outlay submission.

If approved, the capital outlay study funds will usually be allotted directly to DCAM which will supervise the study on behalf of the agency.

If the funds are allotted to the agency instead of DCAM, or if the agency can provide its own study funds from other sources to hire a consulting designer, these agency funds should be transferred to DCAM when the designer is selected.

In all cases, the agency, in its request to DCAM, should outline the need for the study, the objectives and general scope of work required, and its relationship to the agency's long range plans.

DCAM will review the scope of work in detail with the agency prior to initiating the study process.

Once the scope of work and funding are approved, then DCAM will request the Designer Selection Board (DSB) to solicit and select a consulting design firm, if required.

**3.2 Communications and Directions:** Studies shall be prepared by a study designer (consulting or staff) only when authorized in writing by the DCAM Director of Programming.

DCAM is the supervising agency for all studies, with statutory authority to control and direct the scope of work. DCAM shall designate a Study Manager to supervise the study and represent DCAM.

The Operating Agency is responsible for providing relevant information and can make recommendations on the conduct and scope of the study. The operating agency and local user agency or institution shall designate staff to represent agencies.

The Study Designer is responsible for the overall conduct of the study, for technical accuracy and for coordination of all work by him and his consultant, if any. Services are to be such that detail checking is not required by DCAM or the user agency.

**3.3 Meetings, Reports and Internal Reviews:** DCAM will arrange the initial project conference, after appropriate administrative clearance have been received. This conference will be attended by the Study Designer, the Operating Agency and the local User Agency.

The purpose of the initial conference is to introduce all parties involved in the project and to discuss the following items:

- the purpose of studies
- the background and nature of the problem
- general study and administrative procedures
- involvement of other parties or agencies
- the study schedule

The Operating Agency should have available at the initial conference a list of preliminary requirements, documents and

personnel available for the study, and copies of project plans and drawings, as appropriate.

The initial conference will usually be held at DCAM offices in Boston, and will be followed in a few days by a conference at the site of the proposed project.

After the site conference, or when otherwise deemed necessary by DCAM, the Study Designer shall submit to DCAM his/her written interpretation of the fully detailed scope of work, with costs and time anticipated for each task.

The Study Designer shall arrange other meetings as necessary with DCAM, the operating agency and the local user agency, and shall submit to each, accurate minutes of these meetings.

The Study Designer shall submit monthly progress reports to DCAM, noting the following:

- work tasks completed and upcoming
- issues needing resolution
- action required by DCAM or other agencies

State reviews and approvals by DCAM are usually required for :

- detailed interpretation of scope of work
- preliminary program
- evaluation of alternatives
- outline contents of final report
- draft text of final report
- final report

Correspondence to DCAM should be addressed to the Director of Programming, to the attention of the Study Manager, with a copy to the operating agency. Include the project number, contract number, project title and location. A letter of transmittal shall accompany the submission of all documents.

- 3.4 External Reviews:** The Designer and Operating Agency shall identify and assess the interests of other public or private agencies or groups in the project and recommend to DCAM whether external involvement required (information, notification, participation, review, or approval authority, etc.) and develop a corresponding strategy to ensure smooth and efficient development of the project.

Code reviews are explained under Section 5.12.

The approval of DCAM and the Operating Agency is required before such external reviews shall take place, whereupon the designer shall prepare for and attend such meetings.

- 3.5 Final Report Reviews:** The Study Designer submits eight (8) sets of the draft study report to DCAM for distribution and review.

A review meeting will be arranged by DCAM if necessary, to discuss comments on the draft report. The reports will be distributed as indicated below, in advance of the meeting.

DCAM transmits four (4) sets to the Operating Agency. The agency in turn, transmits two sets to the local User Agency, which marks up one copy and returns it to the operating agency for approval.

The operating agency returns two sets to DCAM. Both sets should contain *combined* comments from the Operating Agency and local User Agency.

All comments will be reviewed, approved and combined into two sets by DCAM. One marked up set will be transmitted to the Study Designer.

After appropriate changes have been made to the report by the Designer, he/she shall resubmit eight (8) sets to DCAM for further review, if necessary.

When the study is in acceptable final form, the study contract is now considered to be complete, and final payment for services is made to the Designer.

Further changes can be made, if necessary, to the study report *after* completion and *before* certification. Certification is required by Statute *after* appropriation of funds for design and/or construction but *before* final design can begin. Because appropriation may occur a long time after study completion, there may be reason to revise or update the study before the certification.

The study must be certified by the Operating Agency and DCAM before final design can begin. Standard forms will be provided by DCAM.

## **4.0 Study Process- General Requirements**

This section of the guidelines describes the study process and the end-product, which is the study report.

- 4.1 Statutory definitions:** All projects must fulfill the statutory requirements of a study and program before final design can proceed. The statute provides the following definitions (C.7, S. 39A)

**"study"**, a feasibility or other study to identify and evaluate alternative solutions to and recommend a solution to the needs and requirements defined by the public agency proposing a capital facility project which may involve a further definition of that agency's needs and requirements, gather additional information on the nature of the project, develop and review potential solutions to those needs and requirements, evaluate the financial, environmental, and other aspects of such solutions, estimate the degree to which solutions do not fulfill proposed objectives and criteria and recommend a means of project implementation and site acquisition.

**"program"**, a document which defines a capital facility project in terms of its content, time, and cost so that it provides a clear and detailed frame of reference for the design and implementation process, the preparation of such document involving the gathering of data and the analysis of cost necessary to (i) the production of content, time and cost plans based on criteria deriving from those originally defined by any study or similar report and as finally stated within the body of

the program itself and (ii) the evaluation of those plans in terms of such criteria.

According to the statutory definitions, the study precedes the program and the program is merely a continuation of the process leading to a final definition of the project. Hence, for simplicity, the word "study" in these guidelines shall include the statutory meaning of both study *and* program, and *both* elements must be completed satisfactorily before certification will be made by DCAM, allowing final design to process.

**4.2 Level of detail:** The contents of the study should be sufficiently detailed that the final designer does not have to repeat the study procedures, but can move directly into final design. For example:

- In the case of large or complex projects a series of studies, of varying scope and depth, will probably be required before a final program has been developed in sufficient detail for certification. These earlier studies may include master plans or studies of site alternatives, etc.
- In the case where an operating agency has already prepared a detailed program for the project, the study will be largely a task of questioning the agency's assumptions and justifying the program, often resulting in a *revised* program, before determining alternative design solutions.
- In the case of small projects, a single, short study may suffice, and the process greatly simplified.

**4.3 Accuracy:** Accuracy in the study is very important, because the statute limits the degree of any deviation between the study

solution and the final design solution. This deviation cannot be "substantial", nor can it result in more than a 10% change in the total floor area (if applicable). However, a redistribution of areas and costs can occur within the total figures for the project.

**4.4 Types of graphic plans:** Three types of graphic plans are usually required in a study report, depending on the type of project:

- (i) **Conceptual diagrams** - to illustrate certain written design criteria -- e.g., functional relationships, access, etc.
- (ii) **Pre-schematic plans** - (freehand or straight-line) to illustrate several alternative solutions. These plans need only be developed in sufficient detail for comparative evaluation. Thus, only the more important criteria need be illustrated (e.g., organization, functional efficiency, cost, etc.) and not the details (e.g., interior partitions), since costs can be compared on a per square foot basis at this stage, rather than through "take-offs" of all elements.
- (iii) **Schematic plans** - freehand or straight-line) to demonstrate only the preferred solution in more detail. For example, these plans should normally include the interior partitions, if any, so that more accurate "take offs" can be made by the cost estimator. (See section 5.13 for more detail on content of schematic plans).

**4.5 Appearance versus function:** The study should not place an aesthetic "straight jacket" on the ultimate designer, unless this is a valid subject to be controlled under the circumstances (e.g., historic or environmental design factors). Normally, the study



should allow for an appropriate level of design freedom within the bounds set by design criteria which will ensure a functional and economic result. The form and appearance of the eventual design are the responsibility of the final designer.

Thus , the final designer is not required to accept the schematic design of the preferred solution in the study, and should base the design primarily on the written design criteria and on the conceptual diagrams.

## **5.0 Study Process -- Detailed Requirements**

Due to the variety and nature of projects (e.g., from an entirely new institution, to a renovation of a utility system), each study will vary as to the specific requirements.

The particular requirements of a study should be determined during the initial conferences, after which the designer should prepare a more detailed scope of work for the approval of DCAM and the operating agency.

The following listing of activities should be considered minimum, generic requirements.

- 5.1 Project Justification:** The extent of need for the project must be verified during the study process. DCAM will usually conduct preliminary meetings with the operating and/or user agencies to discuss the need for the project. The study designer, once under contract, is expected to verify and document the extent of this need.

Written information should be supplied by the agencies, if necessary, to verify both the type of project (e.g., inadequate space or services) and the scale of project (e.g., shortage of 50 units). Before proceeding further, it may be necessary to clarify agency policy and substantiate prior agency decisions or forecasts (e.g., population projections), and to investigate the origin and background of the project.

- 5.2 Statement of Problem:** The questions to be answered through the study must be clarified and redefined. Parameters to the problem should be clearly established. Some studies may begin with clearly defined limits, while in others the overall problem may

not be readily apparent and there may be no pre-conceived idea of what the final result might be.

Distinguish between the overall problem to be resolved and the component needs to be met. These needs will be investigated later (see sections 5.5 and 5.11)

**5.3 Objectives, Process and Schedule of Study (work plan):**

Define specific objectives and output to be achieved during the study, detail the work tasks and schedule, and allocate staff and costs to ensure completion of the study.

**5.4 Existing Conditions:** Analyze existing conditions, including activities, buildings, site and environment.

Sufficient information should be assembled on the problems and opportunities with existing buildings and site, so that all major implications for future requirements and design can be accurately judged.

In particular, the information should be sufficient to establish beyond reasonable doubt:

- that the State has clear title to the property;
- that the property is available for development;
- what development restrictions apply, if any; and
- whether any serious subsoil or other physical conditions apply which might have an impact upon eventual construction.

These issues are particularly important for major expansion projects. The information may be provided in the form of photographs or drawings where applicable.

DCAM or the user agency will furnish to the Designer available drawings, surveys, photographs and subsoil exploration reports of the Project's existing buildings (if any) and the site or sites. (See Appendix, section 9, for details).

The study shall contain a clear, written statement of the methods and assumptions of, and limitations on the accuracy of, any information provided under this section. The designer shall recommend in the study what further work should be carried out during final design.

**5.5 Program Needs:** Information should be developed on the following types of needs of the proposed facility:

*relationship of needs*

direct needs (e.g., housing)

indirect needs (e.g., recreation)

side effects (e.g., impact on utilities)  
(e.g., temporary relocation)

*priority of needs*

immediate needs

short term needs

longer term needs

The above information may be presented as an initial statement of needs, if appropriate, or included in the preliminary program (see 5.7 following).

**5.6 Standards and Policies:** Identify standards and policies for provisions of certain needs (e.g., allocation and utilization of space.) Where no formal standards or policies exist, they will have to be developed, e.g., through comparison of similar facilities elsewhere. The source of standards and policies must be clearly identified.

Program requirements should be reviewed and approved by the operating agency, to ensure an over view and compliance with agency standards.

**5.7 Preliminary Program:** As the next step, the needs should be translated into a preliminary program. The format should be the same as that for the final program (section 5.11), but in lesser detail and with the accent on major design directives, such as determinants of building image, functional efficiency and site development:

The suggested format includes:

- a. *Functional description* (e.g. functions, activities)
- b. *Qualitative criteria* (e.g. appearance, security)
- c. *Organizational criteria* (e.g. location arrangement)
- d. *Quantitative criteria* (e.g. number, size)
- e. *Technical criteria* (e.g. equipment)

Criteria should be performance oriented rather than prescriptive, where possible. Conceptual diagrams are required to illustrate the design criteria

**5.8 Development of Alternatives:** Emphasis should be placed on developing a few, reasonable, economical and practical solutions to evaluate. Each alternative should satisfy the standards and policies (under 5.6). The types of alternatives to be considered should be reviewed and approved by DCAM and the Agency before they are developed in any detail.

**5.9 Evaluation of Alternatives:** Evaluation will include an examination of the degree to which alternatives fulfill stated design criteria (under 5.7), as well as additional criteria developed

specifically to compare and evaluate alternative solutions. Emphasis should be on major criteria which can be used to judge if alternatives meet basic requirements, including efficiency and cost effectiveness.

Comparative cost analyses for the various schemes may be required in many instances, and cost figures should be developed as far as possible in the early stages of the study. Where operating and maintenance costs or life cycle costs are applicable to evaluation of alternatives (for instance, with a choice between repair versus replacement of facilities), these costs should also be addressed in the study (see section for more detail.)

The level of detail of plans for each alternative should be sufficient for comparative evaluation purposes only.

**5.10 Recommendation of Preferred Solution:** A preferred solution shall be recommended in the final study report. However, in approved cases the alternatives may be explained and the decision deferred to the agency, legislature or final designer. Such cases must be approved by the Director in writing.

The solution may be phased in order of priority of need, if appropriate. It is possible, in some cases, that the study may recommend a "no-build" solution. If the need for the project, as originally conceived, proves questionable, then consideration should be given to the impact on the operating agency if the project is not implemented, and what alternative methods of satisfying needs should be considered.

#### **5.11 Final Program for Preferred Solution:** All program

requirements for the preferred solution shall be documented in a detailed and explicit statement of design and operational criteria.

The criteria should be written to be used in four ways:

- a) as confirmation of the user's needs;
- b) as precise instructions or "design directions" to the final designer;
- c) as a basis for cost estimating, and
- d) as a basis for post-occupancy evaluation.

It should be noted that the statute requires that certain projects have a post-occupancy evaluation, which should be based on the program and be appropriate in scope and detail to the type, cost and significance of the project being evaluated. The post occupancy evaluation is intended to test how well the program actually satisfies user needs, how the designer has interpreted the program, and what lessons can be learned for future projects. (A separate set of guidelines will be issued for post-occupancy evaluations.) Hence the design criteria must be logically ordered and preferably measurable.

To facilitate the presentation of these criteria, the project should be sub-divided into its component parts (e.g., functions or subsystems). The choice of the breakdown depends on the nature and complexity of the project, but it should be arranged so as to emphasize the more critical factors, e.g.:

- (a) *External design directives* (determinants of building location, etc.
- (b) *Internal design directives* (circulation system, etc.) For each component part (e.g., reception room) provide the following criteria, as appropriate:

- a.) Functional description (e.g., functions, activities, type and number of person served and staff.)
- b.) Qualitative criteria (e.g., appearance, security etc.)
- c.) Organizational criteria (e.g., location, arrangement, relationship, circulation, flow, etc.)
- d.) Quantitative criteria (e.g., number, size, etc.)
- e.) Technical criteria (e.g., structure, finishes, fittings, fixtures, equipment, controls, services, utilities, special requirements, etc.)

See section II for examples of detailed format of final program for building projects having spatial elements such as rooms in buildings.

**5.12 Compliance with Codes and Regulatory Standards:** The designer shall identify in the report all codes and public regulations required for design and construction, and the preferred solution shall comply with these codes and regulations. If appropriate and applicable, the designer should request that code officials tour an existing facility to ascertain all needs for full code compliance. Such codes include but are not limited to the *State Building Code*, *Life Safety Code*, *State Plumbing Code*, and other codes particular to the project -- e.g., American Correctional Association standards.

The designer shall identify in the report the type of construction classification and use group for each building as defined by the State Building Code.

**5.13 Study Schematic Design:** The purpose of the study schematic design is:



- a) to demonstrate the practical operation of the design criteria, codes and standards, to prove that a workable solution is possible;
- b) to develop accurate cost estimates; and
- c) to illustrate the preferred design solution.

The schematic design is *not* intended to set in concrete the complete form of the design which the final designer must later adopt, if the project goes ahead. For instance, while the final designer cannot, by law, deviate from the total square footage in the program by more than 10%, individual functional areas can be adjusted within that total amount, so long as the design criteria is followed.

The final designer is expected to review the study for accuracy, but it is expected that studies should save time and cost by avoiding unnecessary duplication of pre-design activities.

**5.14 Design Content:** The content of the schematic design should include, where appropriate:

- a) An outline of major site and architectural features, including functional arrangements;
- b) An outline of major construction systems and materials;
- c) An outline of major mechanical and electrical systems;
- d) The source and method of obtaining all utilities;
- e) An outline of storm water and sanitary sewage disposal systems;
- f) The location and number of other significant cost items; and
- g) Delineation of any special features

The detail of the design must be sufficient that all major issues are functionally resolved and all major cost items identified. Any issues remaining unresolved must be clearly noted as such in the report so that they are addressed in the final design, assuming the project goes ahead.

The *form* of the schematic design documents should be sufficient to convey all necessary information. They may include floor layouts, typical cross sections, sketch elevations, and site plan as appropriate, as agreed between the study Manager and the designer.

Drawing sizes should be 28 x 40 inches, unless approved otherwise in writing. Include a graphic scale on all appropriate drawings, since these may be reduced down to 8.5" x 11" for inclusion in the final report. (See section 7 for format of final report).. Tabulated data should include the total or gross square footage (if applicable), and the net to gross ratio assumed.

## 6.0 Cost Estimates

- 6.1 Statutory requirements:** If required by the scope of work, an estimate shall be made of the study schematic layout, incorporating the final program.

The estimator should be made aware of the statutory requirements in studies that a separate designer ("final designer") must prepare the final design, that the final designer cannot make any "substantial deviations" to the proposed program in the study; and that the total of all deviations can in no event be greater than 10% of the total floor area (if applicable), although a redistribution of areas and costs can occur within the total figures for that project.

- 6.2 The Cost Estimator:** Because of the importance of an accurate cost estimate in determining the feasibility of a project, in almost all cases the cost estimate should be prepared by a professional cost estimator. The name of the estimator shall be submitted to DCAM for approval in writing by the Director, prior to estimating. Estimates shall bear the name of the estimator and the date the estimate was made.

- 6.3 The "value date":** The value date of the estimate shall always be the same as the date of the submission of the approved final study report to DCAM -- as if the project were to be bid on that date. This completion date should be shown on the cover of the report. However, if the estimate has been calculated at a date significantly *earlier*, due to delay in finalizing and issuing the report, then the value date of the estimate shall be clearly indicated in the cost estimating chapter of the study report, and

also next to the cost figure itself wherever it occurs in the report -- e.g., "\$3,250,000" (Dec. 1999 dollars).

- 6.4 Format of Estimate:** The cost estimate should be in appropriate detail, using Unifomat. Unifomat organizes construction information based on the physical parts of a building called systems and assemblies, which are characterized by their function without identifying the products that compose them. (for more information, go to [www.csinet.org/](http://www.csinet.org/)). Items that contribute significantly to the cost of the project, or are unusual or particular to the project should be highlighted.

**6.5 Unifomat: Construction Systems and Assemblies**

<i>A</i>	<i>Substructure</i>
A10	Foundations
A20	Basement Construction
<i>B</i>	<i>Shell</i>
B10	Superstructure
B20	Exterior Enclosure
B30	Roofing
<i>C</i>	<i>Interiors</i>
C10	Interior Construction
C20	Stairs
C30	Interior Finishes
<i>D</i>	<i>Services</i>
D10	Conveying Systems
D20	Plumbing
D30	Heating, Ventilating, and Air Conditioning (HVAC)
D40	Fire Protection Systems
D50	Electrical Systems
<i>E</i>	<i>Equipment and Furnishings</i>
E10	Equipment
E20	Furnishings
<i>F</i>	<i>Special Construction and Demolition</i>
F10	Special Construction
F20	Selective Demolition

<i>G</i>	<i>Building Sitework</i>
G10	Site Preparation
G20	Site Improvements
G30	Site Civil/Mechanical Utilities
G40	Site Electrical Utilities
G90	Other Site Construction
<i>Z</i>	<i>General</i>
Z10	General Requirements
Z20	Bidding Requirements, Contract Forms, and Conditions Contingencies
Z90	Project Cost Estimate

**6.6 Material installation, overhead and profit:** These items are to be clearly identified in the following manner:

- (a) "**Bare costs**" for material and installation (labor and equipment), and for general and special conditions (e.g., contractor's equipment, special agency requirements, etc.)
- (b) **Subcontractors' overhead and profit:** Specify the % to be added for subcontractors' overhead and profit. This can be included in the bare cost figures in (a) above, or listed separately. (It is acceptable to use 15%, as recommended by R.S. Means, if applicable).
- (c) **General contractor's overhead and profit:** Specify the additional % to be added for the General Contractor's Overhead and profit. (It is acceptable to add 10% to the total including subcontractor's Overhead and profit , as recommended by R.S. Means, if applicable.)

**6.7 Designer contingency:** A designer contingency should be provided. It is explained in the following statement which must be included in full in the text of the study report:

" A design contingency of \_\_\_\_% is included to allow for unforeseen changes made during the final design state by the final designer, who must be selected separately by the Designer Selection Board. Minor changes can be expected to the program and schematic design presented in this study, but the total of all deviations can in no event be greater than 10% of the total floor area (if applicable), although a redistribution of areas and costs can occur within the total figures for that project".

Allow 5-15% for the design contingency, depending on the complexity and detail of the study and the acceptable degree of variation from the study solution

**6.8 Items not included in estimate:** DO NOT include in the estimate the items listed below:

- (1) Construction contingency (This is to provide for unforeseen changes during construction -- e.g., unexpected foundation difficulties.)
- (2) Final Designer's fees
- (3) Resident Engineer's fees
- (4) Final designer's reimbursables (surveys, borings, tests, laboratory work, photography, out-of-state travel, etc.) However, the study designer shall identify in the study any special tests or other studies which will be required during the final design stage -- see "Schedule" following.
- (5) Advertising and Blueprinting
- (6) Moveable furnishings and equipment
- (7) Land acquisition costs

- (8) Building cost escalation. (DCAM will apply an escalation from the "value date" of completion of the study estimate to the anticipated date of bid.
- (9) Agency project management

**6.9 Statement:** Include this statement in bold type where the estimate is first provided in the study report (e.g., in the executive summary) and also beside the final calculation of the ECC:

"This estimate does not allow for building cost escalation; construction contingencies to allow for unforeseen changes during construction leading to change orders; final designer's fees; resident engineer's fees; designer's contract reimbursables; advertising and blueprinting; moveable equipment and furnishings; land acquisition costs and agency project management."

**6.10 Annual Costs:** Determine and explain the impact of the proposed scheme on the annual costs of the facility concerned, whether an increase or decrease for the following categories:

- (a) Repairs/preventive maintenance.
- (b) Utilities.
- (c) Staffing.

The value date of the above costs shall be the same as the value date of the ECC; in other words, it should be assumed that the project is actually complete and occupied on this date, so that current cost figures can be used. The current cost figures shall be made available by the user or operating agency.

## **7.0 Implementation Schedule**

The objective of the schedule or phasing plan is to determine the sequence and duration of key sets of activities, and the major milestone dates for subsequent stages of the project assuming the project is approved by the legislature, including:

- 7.1 Project approvals:** Identify key approvals, permits and licenses needed, other than from DCAM and the operating agency, before design and/or construction can commence -- e.g.,

Determination of Need (DON)

Environmental Impact Report (EIR)

## **7.2 Design and Construction Period**

(1) *Final Design time*: (split into schematic, design development and construction documents phases ). Allow at least two weeks for review and approval of each phase; and up to 10 weeks for large or more complex projects.

(2) *Bid time*: Allow 3 to 6 months between

(a) date of submission by designer of final reproducible, contract/bid documents and

(b) date of construction start by contractor.

The time will vary depending on the size and complexity of the job. Include the following explanation of the bid period in the text of the study:

"the bid period includes in-house and user-agency review and approval, reproduction services, statutory bid procedures, pre-qualification of all general bidders, post-qualification of low bidders, contract document signing and processing of various paperwork, such as



miscellaneous approvals, legal review of contract and obtaining insurance and bonds, etc."

(3) *Construction time*: Provide total construction time and identify and special phasing considerations.

(4) *Total time elapsed from start of design to occupancy*. Present the above data in acceptable form, i.e. bar chart or list. Provide an overall summary of the schedule and tasks. Start the bar chart at the beginning of services of the final designer.

Highlight priority actions and activities required which may have a major impact on the schedule.

## **8. Format of Final Report**

The report should document the entire study process and present all relevant information.

An outline of the report shall be presented to DCAM for approval prior to preparing a first draft. The procedure for review of the draft is provided in section 3.5

The report shall be of professional quality, sized 8.5 x 11 inches, upright or horizontal. It should include reductions of all important illustrations. Unless approved otherwise in writing by the Director, reimbursement of reduction costs will not be provided. Large graphics can be folded into a special pocket at the back of the report.

### **8.1 Format of cover page**

The cover page may include an appropriate graphic. Written information is to include the following:

Study of .....(title and location)

Massachusetts Project Number: .....

Contract No.....

Prepared for

Office of Programming

Division of Capital Asset Management

by (designer's name)

Date of completion (year and month)

### **8.3 Preface**

(include the wording below, if appropriate to the scope of work of the study)

This study was prepared for the Office of Programming, Division of Capital Asset Management, Executive Office of Administration and Finance, Commonwealth of Massachusetts, as required by Mass. General Laws C.7 and C.29.

The study is intended to investigate agency needs, evaluate alternatives and define a preferred solution to the building project before final design begins and before a legislative decision is made to appropriate funds for implementation. After appropriation, if any, this study must be certified and thereafter no substantial changes can be made to the study solution during the implementation process. Such deviations are limited by statute to no more than 10% of the total square feet, if applicable, although a redistribution of areas can occur within the total figures for this project.

The study culminates in a final program which defines the preferred solution in terms of its content, time and cost, so that it provides a clear and detailed frame of reference for the design and implementation process. A study schematic design has been included in the study for purposes of illustrating the preferred solution; demonstrating the practical operation of design criteria; codes and standards applicable to the project; and for developing accurate cost estimates. The form of the schematic design is not intended to constrain the final designer, but the functional program criteria, codes and standards must be followed in implementation.

The final designer should review the study and satisfy himself as to the accuracy of the contents before proceeding into design.

However, it is expected that the study should save time and expense by avoiding unnecessary duplication of pre-design activities.

#### **8.4 Typical Table of Contents**

(Actual contents will vary with type of study)

- (i) Certification
  - (ii) Preface
  - (iii) Acknowledgments - project participants.
    - Agencies: Include names of relevant commissioners, directors, project manager, etc.
    - Design team: participants in consulting firms.
  - (iv) Table of Contents
  - (v) List of tables
  - (vi) List of illustrations
- 
- 1. Executive summary** (major issues, findings and recommendations.)
  - 2. Introduction**
    - Statement of objectives
    - Methodology
    - Project history and background
  - 3. Existing conditions**
  - 4. Proposed program needs**
  - 5. Codes and standards**
  - 6. Alternative solutions**
  - 7. Evaluation of alternatives**
  - 8. Preferred solution** - final program description, design criteria and schematic design.
  - 9. Systems Narrative**
  - 10. Cost estimate**
  - 11. Implementation Schedule**

## **9.0 Available Data on Existing Condition -- Surveys, Drawings, Tests**

### **9.1 General**

- a. DCAM or the user agency will furnish to the Designer available drawings, surveys, photographs and subsoil exploration reports of the Project's existing buildings (if any), the site or sites, including any additional information as to water, sewer, electricity, steam, gas, telephone and other services.
- b. Reproducibles of existing site and building plans (e.g. as-built drawings) should be in the possession of the operating agency. The agency should provide a set of prints to the designer or make the Reproducibles available to the designer for printing. If the agency does not have reproducibles, then prints should be loaned and returned. The designer shall return the prints to the agency. Special (extra) printing is a reimbursable expense.
- c. At the study phase, the information (in paragraphs a and b above) should be sufficient to establish beyond reasonable doubt: that the State has clear title to the property; that the property is available for development; what development restrictions apply, if any; and whether any serious subsoil or other physical conditions apply which might have an impact upon eventual construction. These issues are particularly important for major expansion projects.
- d. Detailed land surveys and subsoil investigations should, whenever possible and prudent, be delayed until after the

study is completed and the final designer proceeds, because the final designer can then decide what information he/she needs for his/her own design and he/she can be held liable for the content of the survey. If Land Surveys and Subsoil Investigations are required in the study, they shall follow the procedures outlined in Section (2) and (3) below.

- e. If in the opinion of the Study Designer, sufficient information is not available, he/she shall request authorization to obtain the services of a consultant or perform the necessary work with his/her own employees as an Extra Service. This request shall indicate the type of services required and the need for such additional information. Designers shall request authorization in writing from the Division of Capital Asset Management at an early date in the study
- f. If a consultant's services are required, a detailed description of the proposed services shall be prepared by the Designer and submitted for approval to DCAM. The Designer is then responsible for obtaining several proposals from consultants for the work required, after which he/she shall submit his/her recommendations on the proposals to the Director of Programming at DCAM for approval before any work is authorized.
- g. The cost of any such Extra Service shall be in accordance with the Designer's contract: Whether the Extra Service is to be performed by the Designer's employees, or by a consultant, the proposal must include a detailed breakdown of the number of hours and rates of compensation for each of the personnel who will be engaged. Such rates of

compensation are to be in accordance with Articles 9 and 10 of the Contract for Designer's Services.

- h. The study shall contain a clear written statement of the methods and assumptions of, and limitations on the accuracy of any information provided under this section. The designer shall recommend in the study what further work should be carried out during the final design.
- i. The Designer shall be responsible for coordinating the work of his authorized consultants and shall analyze and evaluate the results. The preparation of drawings and/or specifications needed to obtain surveys of subsoil information, and any other soils engineering shall be prepared by the Designer within the basic fee.

## **9.2 Land Surveys -- if required.**

- a. All land surveys shall be performed by Registered Land Surveyors or Registered Civil Engineers of the Commonwealth of Massachusetts, unless otherwise approved in writing by the Director. The registration stamp shall appear with the registrant's signature on all drawings or maps submitted.
- b. Surveys shall conform with the *Professional Practice of Surveying and Mapping within Civil Engineering* as adopted by the American Congress on Surveying and Mapping (ACSM).

- c. In preparing the description of work for a survey the following requirements should be included when applicable:
  - (1) Locate all pertinent structures and utilities.
  - (2) Establish permanent base lines with reference points.
  - (3) Establish bench marks.
  - (4) Locate property lines and bound corners if site is newly acquired.
  - (5) Topography.
- d. The Designer is instructed to coordinate all survey work in such a manner that control points and a main baseline can be reproduced in the field.
- e. A Guide Specification for Perimeter and Topographic Survey is available from the DCAM upon request.

**9.3 Subsoil Investigations -- if required.**

- a. All subsoil exploration and soil testing shall be performed by qualified experienced firms.
- b. The Designer will provide the location and ground surface elevation for each boring. No change in boring locations shall be made unless prior consent of the Designer is obtained. Boring locations shall be referenced to the main survey baseline whenever feasible.
- c. A Guide Specification for Test Borings is available from DCAM upon request.



## **10.0 Site Selection**

The following procedures shall apply if site selection is included in the scope of work for the study:

**10.1 Develop site criteria:** Identify locational requirements and environmental concerns and develop appropriate site selection criteria. These should be weighted to facilitate evaluation. They should include, but not necessarily be limited to the following; depending on whether new construction, renovation or rental of existing buildings is considered:

- a.) Area and configuration availability
- b.) Topography
- c.) Soil conditions
- d.) Site preparation costs
- e.) Expansion potential (and estimated costs)
- f.) Site availability and cost
- g.) Utilities
- h.) Accessibility
- i.) Amenities
- j.) Social and environmental factors
- k.) Regulatory constraints
- l.) External/policy concerns

**10.2 Select and Evaluate Sites:** This should take place in the following sequence:

- a.) Examine whether surplus state-owned property or space in state buildings is available (Utilize the DCAM Real Property Inventory.)
- b.) If no suitable state-owned property is available, then examine other publicly-owned property (cities, towns,

counties, etc.) Check with local authorities. (rent or purchase)

- c.) If no suitable publicly-owned property is found for rent or to purchase, then DCAM shall advertise for proposals for rent or purchase from private owners, as required by MGL C. 7, S. 40.

If it has been determined that the rental of privately-owned space is the most feasible option, then the DCAM Real Property procedures must be followed. A detailed Request-for Proposals should be prepared which clearly states the space requirements for the user agency. This RFP should be publicly advertised. However, if the property required is unique, then advertising may be waived by DCAM, providing that the agency submits proper justification.

- Evaluate each site against the applicable criteria.

- Recommend the site or sites indicated as most suitable.

- Document the evaluation and selection process. Compile data in a narrative form and include scaled plot plan or maps if applicable.

If site acquisition of a property is recommended, the statutory procedures of MGL, S.40L must be followed prior to further action, as summarized below:

- Notify the local municipal authority of the proposed purchase and future use at least 60 days before the sale or rental date.

- Notify the relevant Regional Planning Agency of the same.

- Conduct a public hearing in the city or town where the property is located at least 30 days prior to sale or rental date.

Forms are available from DCAM Real Property Office, which must be contacted before any sale or leasing arrangement can occur.

## **11.0 Final Program for Projects Having Spatial Components**

The following is a detailed format for final programs of building projects having spatial components (e.g., rooms rather than utility systems). While this format is not a requirement, the equivalent information is to be provided if other formats are used. The information below is essentially an elaboration of section 5.11 (Final Program for Preferred Solution) and may be used as a check list of items to be covered.

To facilitate the presentation of the design criteria, the project is broken down into spatial elements in three levels; facility spaces, group spaces and unit spaces. For each spatial element a criteria sheet is prepared. (See subsequent pages for details.)

It is a decision of the designer as to how the project should be divided into spatial elements. In some cases, group spaces will not be required; in others (e.g., a general purpose office building) unit spaces will not be detailed. The choice of the spatial element breakdown depends on the nature of the project.

## Sub-Division of Project into Spatial Elements (Sample Breakdown)

LEVEL 1	LEVEL 2	LEVEL 3
<u>Facility Spaces</u>	<u>Group Spaces</u>	<u>Unit Spaces</u>
1. Site	1. Circulation Routes	1. Pedestrian circulation
2. Vehicular circulation.	2. Parking area	2. Building
1. Management	1. Director's office	
2. Conference room	2. Health Unit	
3. (Other)		
1. Waiting Room		
2. Counseling		
3. Treatment		
4. (Other)		

## **Criteria Sheet**

The Criteria Sheet is used for presenting criteria for each spatial element.

The Criteria Sheet consists of a *Functional Description* of the space and four categories of *Criteria* pertaining to that space. These are in an order from the general, qualitative, or subjective criteria, down to the specific, technical or objective criteria. In total, this set of five criteria categories is sufficient to describe all aspects of the spatial element. In certain applications, not all categories of criteria will be required.

1.     **Functional Description:** A description of the functional purpose of the space, or of the activities to be conducted in the space, including number of occupants where applicable.
  
2.     **Qualitative Criteria**
  1.   Image;
  2.   Aspect/Orientation;
  3.   Prospect/views
  4.   Finish quality
  5.   Ambiance
  6.   Privacy
  7.   Identify
  8.   Status
  9.   Personal safety
  10. Security
  11. Comfort
  12. Micro climate
  13. Handicapped access

### **3. Locational Criteria**

1. Location
2. Distance from
3. Circulation within
4. Orientation

### **4. Quantitative Criteria**

1. Area
2. Number of
3. Length
4. Breadth
5. Height
6. Volume

## **5. Technical criteria**

Requirements for project sub-systems based on two generic listings for site and building:

### **SITE SUB-SYSTEMS**

- .1 Recontouring of Site
- .2 Fences and Gates
- .3 Landscaping
- .4 Paving and Surfacing
- .5 Central Heating Distribution
- .6 Storm Drainage
- .7 Sanitary Drainage
- .8 Irrigation Systems
- .9 Water Supply & Distribution
- .10 Gas Supply & Distribution
- .11 Oil Supply & Distribution
- .12 Electrical Supply & Distribution
- .13 Lighting
- .14 Telephone
- .15 Cable TV
- .16 Delivery and Waste Handling
- .17 Site Furnishings
- .18 Signs, Flagpoles
- .19 Fine Art

### **BUILDING SUB-SYSTEMS**

- .1 Structure
- .2 Building Envelope
- .3 Interior Partitions
- .4 Finished Floors
- .5 Ceilings
- .6 Fittings, Fixtures, Equipment
- .7 Conveying Systems
- .8 Plumbing and Drainage
- .9 Fire Protection
- .10 HVAC
- .11 Power Generation, Transformation
- .12 Electrical Distribution
- .13 Lighting
- .14 Communication Systems
- .15 Control Systems, Clocks
- .16 Smoke and Fire Detection
- .17 Supplies, Waste Handling
- .18 Signage
- .19 Fine Art.



## EXAMPLE OF SPATIAL ELEMENT BREAKDOWN - LEVEL 1

### LEVEL 1: FACILITY SPACES

**SITE** The site consists of 2.5 acres.

**1. Functional Description:** It must contain adequate off street parking screened from view with access off A street. Pedestrian access is to be provided from B street to the retail spaces on first floor.

**2. Qualitative criteria**

- 2.1 Image of openness and hospitality
- 2.2 View from street into public lobby
- 2.3 Privacy for 1st floor health units
- 2.4 Heavily landscaped courtyard for casual seating and outdoor eating

**3. Locational criteria**

- 3.1 Locate building to S.W. of site, close to existing building.
- 3.2 Covered circulation for pedestrians from N.W. corner across parking lot

**4. Quantitative criteria**

- 4.1 37 car parking spaces
- 4.2 3 off street loading spaces
- 4.3 550 sf paved patio
- 4.4 25 foot frontage setback

**5. Technical criteria**

- 5.1 Fencing to S.E. side
- 5.2 Paved parking spaces, etc.
- 5.3 etc.

**EXAMPLE OF SPATIAL ELEMENT BREAKDOWN:      LEVEL 2**

**LEVEL 2:                      BUILDING GROUP SPACES**

**GROUP SPACES:            # 5 HEALTH UNIT**

**1.        FUNCTIONAL DESCRIPTION:** The Health Unit is staffed by personnel of the Department of Public Health who provide on-location health care and counseling. Generally two nurses will be on duty, augmented by occasional visits from a physician.

**2.        QUALITATIVE CRITERIA**

*See unit spaces 1 to 10 inclusive*

**3.        LOCATIONAL CRITERIA**

3.1        Locate the Health Unit in the area of greatest employee concentration, near an elevator to facilitate handling of accident and stretcher cases.

3.2        The Unit should be located away from irritating noise, dust, outdoors and vibration.

**4.        QUANTITATIVE CRITERIA**

4.1        Usable area 550 square feet.

**5.        TECHNICAL CRITERIA**

*See Unit Spaces 1 to 10 inclusive.*

## EXAMPLE OF SPATIAL ELEMENT BREAKDOWN:      LEVEL 3

LEVEL 3:                      UNIT SPACES

UNIT SPACE:                # 31 TREATMENT ROOM

1.      **FUNCTIONAL DESCRIPTION:** An equipped room for treatment of minor problems needing medical attention.
  
2.      **QUALITATIVE CRITERIA**
  - 2.1      Ensure visual and acoustic privacy in this room.
  - 2.2      The room must be designed for easy cleanup after medical treatment.
  
3.      **LOCATIONAL CRITERIA**
  - 3.1      Locate adjacent to *Unit Space 1 Waiting Room* and *Unit Space 2 Counseling Office*.
  
4.      **QUANTITATIVE CRITERIA**
  - 4.1      Usable area 150 square feet
  
5.      **TECHNICAL CRITERIA**
  - 5.3      *Interior Partitions*
    1.      Wall finishes shall be washable.
  - 5.4      *Finished Floor*
    1.      Resilient Flooring with cove base shall be easily maintained. Fittings, Fixtures and Equipment.
    2.      Provide a minimum of 6 feet of counter top space with built-in stainless steel sink.
    3.      Provide a minimum of 40 cubic feet of storage space capable of being locked.

## **12.0 Statutory Definitions**

MGL C.7, Section 39A: As used in this chapter and chapter twenty-nine of the General Laws, the following words and terms shall have the following meanings, unless the context shall clearly indicate a different meaning or intent:

- (a) "**acquisition**", obtaining by gift, purchase, devise, grant, eminent domain, rental, rental-purchase, or otherwise;
- (b) "**addition, expansion and extension**", work which will result in an increase in the overall external dimension of a facility;
- (c) "**administering agency**", the public agency acting on behalf of a using agency;
- (d) "**alteration**", work required to modify or adjust the interior space arrangement or other physical characteristics of an existing facility so that it may be more effectively utilized for its presently designated functional purpose;
- (e) "**building authority**", the University of Massachusetts Building Authority, or the Massachusetts State College Building Authority or any other building authority which may be established for similar
- (f) "**capital facility**", a public improvement such as a building or other structure; a utility, fire protection, and other major system and facility; a power plant facility and appurtenances; a heating, ventilating, air conditioning or other system; initial equipment and furnishings for a new building or building added to or remodeled for some other use; a public parking facility; an airport or port facility; a water resource improvement by the metropolitan district commission such as a waste water treatment and related pollution control facility, solid waste disposal or recovery facility; a recreational improvement such as a facility or development in a park or

other recreational facility; or any other facility which, by statute or under standards as they may be prescribed from time to time by the commissioner of capital Asset Management, according to the provisions of this section, may be defined as such, provided however that a highway improvement such as a highway, bridge or tunnel or other structure or building integral to the operation of the Central Artery/Ted Williams Tunnel Project in the city of Boston and the city of Cambridge; a transportation improvement such as a mass transportation or other public transit facility, but not including a department of transportation building in the Park Square area of the city of Boston, shall not be considered a capital facility as defined herein;

- (g) "**capital facility project**", an undertaking by a public agency for the planning, acquisition, design, construction, demolition, installation, repair or maintenance of a capital facility.
  - (g1/2) "**building project**", a capital facility project undertaken for the planning, acquisition, design, construction, demolition, installation, repair or maintenance of any building and appurtenant structures, facilities and utilities, including initial equipment and furnishings thereof; provided, however, that appurtenant buildings or structures which are required to be constructed as integral parts of the development of sewer, water and highway systems shall not be subject to section thirty-eight C.
- (h) "**construction**", new construction, alteration, renovation, rehabilitation or other activity that is intended to result in a significant increase in internal usable space;
- (i) "**control and supervision**", authority to perform or contract for performance;

- (j) "**conversion**", work required to modify or adjust the interior space arrangement or other physical characteristics of an existing facility so that it may be effectively utilized for a new functional purpose;
- (k) "**energy audit**", in-depth engineering analysis of factors causing energy waste in building that investigates the amount and cost of energy waste and compares the energy waste with the expense of remedying the energy waste on a cost-effective basis;
- (l) "**energy conservation projects**", projects to promote energy conservation, including but not limited to energy conserving modification to windows and doors; caulking and weatherstripping; insulation, automatic energy control systems; hot water systems; plant and distribution system modifications including replacement of burners, furnaces or boilers; devices for modifying fuel openings; electrical or mechanical furnace ignition systems; utility plant system conversions; replacement or modification of lighting fixtures; energy recovery systems; and, cogeneration systems;
- (m) "**maintenance**", day-to-day, routine, normally recurring repairs and upkeep;
- (n) "**master plan**", a study or description of a complex or group of buildings or any large or multi-faceted project which is intended to ensure that the various components of the complex shall be compatible with each other, and that the project as a whole shall be compatible with its surroundings;
- (o) "**oversight**", control and supervision, except for final approval of any contract, pre-design or design document or any alteration or modification thereof, payment, certificate of substantial completion, use and occupancy, or final acceptance;

- (p) "**planning**", in reference to a particular capital facility project, the preparation of a master plan, study, program or similar report or analysis the purpose of which is to define the content, cost, and schedule of the project so as to establish a frame of reference prior to design, acquisition, construction, demolition, installation, or maintenance;
- (q) "**program**", a document which defines a capital facility project in terms of its content, time, and cost so that it provides a clear and detailed frame of reference for the design and implementation process, the preparation of such document involving the gathering of data and the analysis of cost necessary to (i) the production of content, time and cost plans based on criteria deriving from those originally defined by any study or similar report and as finally stated within the body of the program itself and (ii) the evaluation of those plans in terms of such criteria;
- (r) "**public agency**", a department, agency, board, commission, authority, or other instrumentality of the commonwealth or political subdivision of the commonwealth or two or more subdivisions thereof;
- (s) "**real property**", land, buildings, appurtenant structures and fixtures attached to buildings or land, including where applicable, all interests in real property, whether created by title, lease, easement or any other legal interest;
- (t) "**renovation**", work required to restore and modernize most or all of a facility in order that the facility may be effectively utilized for its designated functional purpose or to comply with current code requirements;
- (u) "**repair**", work required to restore a facility or system to such condition that it may continue to be approximately and effectively utilized for its designated purpose by overhaul, reprocessing or replacement of constituent parts or materials

which have deteriorated by action of the elements or wear and tear in use;

- (v) **"state agency"**, a state agency, board, bureau, department, division, section, or commission of the commonwealth or county; provided, however, that in sections forty E to forty L, inclusive, state agency shall not include counties.
- (w) **"study"**, a feasibility or other study to identify and evaluate alternative solutions to and recommend a solution to the needs and requirements defined by the public agency proposing a capital facility project which may involve a further definition of that agency's needs and requirements, gather additional information on the nature of the project, develop and review potential solutions to those needs and requirements, evaluate the financial, environmental, and other aspects of such solutions, estimate the degree to which solutions do not fulfill proposed objectives and criteria, and recommend a means of project implementation and site acquisition;
- (x) **"using agency"**, the public agency which will be the major user of a capital facility project or the occupant of a building project;
- (y) **"utility systems projects"**, installation, extension or replacement of systems for the provision of sewer, water and electrical service, power plant facilities and appurtenances, heating, ventilating and air conditioning, elevators, fire escapes, sprinklers and automatic fire alarms and telephone communications;

The commissioner of Capital Asset Management, after review by interested public agencies who may seek to initiate capital facility projects, shall establish standards as to what shall constitute a



capital facility and what shall be a capital expenditure for the purpose of defining what shall constitute a capital facility project.

## **13.0 Relevant Sections of the Massachusetts General Laws**

### **Chapter 7: Section 40A. Jurisdiction of department over capital facility projects.**

Except as otherwise provided in this section or by any other statute or appropriation, the division of capital asset management and maintenance shall exercise jurisdiction over capital facility projects to the extent provided below:

- (1) Control and supervision of all building projects undertaken by any state agency, except to the extent provided for by sections forty B and forty-three C and that the division shall exercise oversight jurisdiction over building projects undertaken by a state agency that are financed or funded from sources other than an appropriation or the issuance of bonds, notes or other evidences of indebtedness of the commonwealth. Using agencies shall cooperate in any inquiries or inspections conducted by the division of capital asset management and maintenance.
- (2) Oversight as to building projects undertaken by any building authority, except to the extent provided for by section forty B and forty-three C of chapter seven. Building authorities shall cooperate in any inquiries or inspections conducted by the division of capital asset management and maintenance to ensure conformity with all applicable standards and guidelines.
- (3) For housing projects within the jurisdiction of the department of housing and community development as defined by section one of chapter one hundred and twenty-one B, the division of capital asset management and maintenance shall provide only for the establishment of minimum requirements for record keeping and reporting by the department and operating agencies, as each is defined by section one of chapter one hundred and twenty-one B, and review of and recommendation as to the standards and guidelines for, direction, control, and supervision of their building projects. The department and operating agencies shall cooperate with the division of capital asset management and maintenance, regarding inquiries and inspections conducted as to housing projects within their respective jurisdictions.
- (4) For all capital facility projects of cities and towns for which specific approval or authorization by the general court or a state agency is otherwise required and for all capital facility projects of all other public agencies not included within the scope of paragraphs (1), (2), and (3), establishment of requirements for record keeping and reporting by the administering agency as to control and supervision of capital facility projects, so that the division of capital asset management and maintenance may assess the nature, scope and programs of all planned or current capital facility projects and fulfill its responsibilities as defined by this chapter and other relevant statutes. For the purposes of identifying agricultural lands, the commissioner shall utilize criteria established by the secretary of environmental affairs. Such criteria shall determine agricultural land according to past and present agricultural use, and according to the agricultural production suitability of land as defined by the standards of the United States Department of Agriculture Soil Conservation Service. For all capital facility projects or programs funded in whole or in part by federal funds, the record keeping and reporting requirements established pursuant to this paragraph and other relevant statutes may be satisfied by the federal requirements, but only to the extent that the state requirements duplicate the federal requirements or materially conflict with them. State and federal requirements shall be deemed to be materially conflicting only when it would be impossible or unduly burdensome to comply with both sets of requirements. Neither this provision nor any other provision of sections thirty-nine A through forty-three F, inclusive, of this chapter is intended or shall be construed to limit the authority of any public

agency -- other than those specified in paragraphs (1) and (2) of this section -- to control and supervise any capital facility project undertaken by that agency.

**Chapter 7: Section 40B. Control and supervision of building projects.**

The commissioner shall, in a manner and to the extent provided by this chapter, control and supervise any building project to be undertaken by a state agency or building authority when the estimated cost of the project exceeds one hundred thousand dollars and involves structural or mechanical work. The commissioner may, upon request of a state agency or building authority, delegate project control and supervision to that state agency or building authority over projects involving structural or mechanical work whose estimated cost is less than two hundred thousand dollars if the commissioner determines that the agency or authority has the ability to control and supervise such project. Except as otherwise provided in this section, any state agency or building authority shall control and supervise its own building projects when the estimated cost of such project is less than one hundred thousand dollars, or if the project does not involve structural or mechanical work.

**Chapter 29**

**Section 7K. Study or program as prerequisite for appropriation or authorization.**

Every appropriation or authorization for the design or construction of a building project for which a state agency is the using agency shall be deemed to require the satisfactory completion of a study or program before any services for the design or construction of such project may be contracted for, performed by contract or otherwise, or funds allotted, encumbered or expended therefor, unless such appropriation or authorization specifically states that no such study or program need or shall be done.

No provider of design services for any building project for which a state agency is the using agency shall be selected by the designer selection board or by the administering agency in accordance with the provisions of sections *thirty-eight A*  $\frac{1}{2}$  *thirty-eight O inclusive* of chapter seven and no design services shall be performed for or by such administering agency for any building project for which the satisfactory completion of a study program is required prior to the design or construction of that project, unless and until:

- a. said study, program or where appropriate, both, have been satisfactorily completed;
- b. the using agency certifies in writing to the deputy commissioner of capital planning and operations that the study, program, or where appropriate both, correspond to the current needs of that agency, including its current long term capital facilities development plan;
- c. the deputy commissioner requests that one or more of the directors of the office of programming, office of project management, or office of facilities management review the study or program, or where appropriate, both, and the director or directors certify in writing to the deputy commissioner that the study, program, or where appropriate both, reflect the using agency's needs as stated, that they provide an accurate estimate of the project requirements, cost and schedule, that the project can be accomplished within the appropriation or authorization for that project, and recommends proceeding with design, construction, or where appropriate, both; and

- d. the deputy commissioner of capital planning and operations certifies in writing to the commissioner of administration that the study, program, or where appropriate both, are in conformity with the scope and purpose of the appropriation or authorization for the project and legislative intent in regard to long range capital facility plans for the using agency, and approves proceeding with design, construction, or where appropriate, both.

If either the director or directors whose review is requested or the deputy commissioner of capital planning and operations should fail to so certify, recommend, or approve, the deputy commissioner shall forthwith send notice of his decision and the reasons therefor to the commissioner of administration and to the house and senate ways and means committees.

## **Chapter 29**

### **Section 26A. Certification of design work; contracts for design services.**

No allotment, encumbrance, or expenditure of funds appropriated or authorized for the design of a capital facility project shall be approved by the comptroller unless the executive head of the agency administering the project or other person provided for by statute certifies in writing that the design work is or shall be such as to specify a project that can be accomplished (a) within the appropriation or authorization for the project or within the project cost limits specified by the appropriation or authorization and (b) without substantial deviation from any (i) study or program which must be prepared in accordance with the provisions of section 7K of this chapter or (ii) any other pre-design document which must be prepared in accordance with any other statute, appropriation or authorization or administrative directive consistent therewith. In no event shall the design work be such as would result in a change in the number of square feet to be constructed in the project of more than ten per cent from the number specified in the study, program or other pre-design document referred to in (b)(i) and (b)(ii).

No state agency as defined by section thirty-nine A of chapter seven administering a capital facility project shall enter into any contracts or incur any other obligations or cause to be performed design services for that project if such would result in the completion of a project which cannot be accomplished (a) within the appropriation or authorization for the project or within the project cost limits specified by the appropriation or authorization and (b) without substantial deviation for (i) any study or program which must be prepared in accordance with the provisions of section 7K of this chapter or (ii) any other pre-design planning document which must be prepared in accordance with any other statute, appropriation or authorization or administrative directive consistent therewith. In no event shall the design work be such as would result in a change in the number of gross square feet to be constructed in the project of more than ten per cent from the number specified in the study, program or other pre-design document referred to in (b)(i) and (b)(ii).